

AMENDMENTS TO THE SPECIFICATION

Please amend the title of the application to read as follows:

APPARATUS AND METHOD FOR CENTRIFUGAL SEPARATION UTILIZING A
MOVABLE COLLECTION ASSEMBLY

On page 4 beginning at line 1, please insert the following new heading and paragraph
immediately preceding the heading entitled “Detailed Description”:

Brief Description of the Drawings

Fig. 1A-D is a set of drawings showing a centrifugal separator according to one embodiment of the invention prior to the addition of a multiphase mixture.

Fig. 2A-D is a set of drawings showing a centrifugal separator as shown in figure 1 after separation of the multiphase mixture and removing a portion of the separated mixture from the separator to waste.

Fig. 3A-D is a set of drawings showing a centrifugal separator as shown in figure 1 after separation of the multiphase mixture and removing a portion of the separated mixture from the separator for further processing.

Fig. 4A-D is a set of drawings showing a centrifugal separator as shown in figure 1 after removal of all components of the separated mixture from the separator and delivering a cleaning solution to the separator.

Fig. 5A-D is a set of drawings showing a centrifugal separator as shown in figure 1 removing the cleaning solution from the separator to waste.

Fig. 6 is a schematic drawing of a particle undergoing rotation.

Fig. 7 is a schematic drawing of a particle in a ring of fluid undergoing rotation.

Fig. 8 is a schematic drawing of a particle in a ring of fluid undergoing rotation with a collection nozzle.

On page 4 beginning at line 3 and ending on page 5, please replace the paragraphs with the following amended paragraphs:

Certain embodiments of the invention will now be described by way of example only with reference to the accompanying drawings and examples, ~~in which:~~

~~Fig. 1 is a set of drawings showing a centrifugal separator according to one embodiment of the invention prior to the addition of a multiphase mixture.~~

~~Fig. 2 is a set of drawings showing a centrifugal separator as shown in figure 1 after separation of the multiphase mixture and removing a portion of the separated mixture from the separator to waste.~~

~~Fig. 3 is a set of drawings showing a centrifugal separator as shown in figure 1 after separation of the multiphase mixture and removing a portion of the separated mixture from the separator for further processing.~~

~~Fig. 4 is a set of drawings showing a centrifugal separator as shown in figure 1 after removal of all components of the separated mixture from the separator and delivering a cleaning solution to the separator.~~

~~Fig. 5 is a set of drawings showing a centrifugal separator as shown in figure 1 removing the cleaning solution from the separator to waste.~~

~~Fig. 6 is a schematic drawing of a particle undergoing rotation.~~

~~Fig. 7 is a schematic drawing of a particle in a ring of fluid undergoing rotation.~~

~~Fig. 8 is a schematic drawing of a particle in a ring of fluid undergoing rotation with a collection nozzle.~~

Referring to figures 1 to 5, the centrifugal separator 1 has a circular bowl 2, a delivery conduit 3, and a collection assembly 4. The delivery conduit 3 delivers the multiphase solution to the bowl 2 in order that the multiphase mixture can be separated into its discrete density phases by rotating the bowl 2 around its central axis. The separated phases form annular columns in the rotating bowl 2. The bowl 2 is open topped and is of a shape that allows the boundary layer between the separated different density phases of the multiphase mixture to be accentuated. The shape of the bowl 2 also allows the removal of all of the separated multiphase mixture by movement of the collection

assembly 4. The collection assembly 4 includes a collection conduit 5, a waste collecting conduit 6, and a cleaning solution conduit 7.

The collection conduit 5 is connected to a ~~pump, not shown~~ pump 10, which is able to either directly pump or create a reduced pressure such that the portion of the separated mixture which is to undergo further processing or analysis is able to be drawn into the collection conduit 5. The collection assembly 4 is moved by a movement control means 13 so that the end of the collection conduit 8 is able to collect that portion of the separated mixture whilst minimizing the disruption to the other portions of the separated mixture during rotation of the bowl 2. This can be achieved by moving the end of the collection conduit 8 so that it is proximal to but not touching the portion to be collected, as shown in figure 3.

The waste collecting conduit 6 is also connected to a ~~pump, not shown~~ pump 10, which is able to either directly pump or create a reduced pressure such that the portion of the separated mixture which is to be discarded is able to be drawn into the waste collection conduit 6. The collection assembly 4 is moved by the movement control means 13 so that the end of the waste collection conduit 9 is able to collect that portion of the separated mixture whilst minimizing the disruption to the other portions of the separated mixture during rotation of the bowl 2. This can be achieved by moving the end of the waste collecting conduit so that it is proximal to but not touching the portion to be collected, as shown in figure 2.

On page 10 beginning at line 1 please replace the paragraph with the following amended paragraph:

In one embodiment, the determination between the various components can be achieved by identifying the boundary layers of the components in the flow of separated mixture from the bowl. Sensing devices, such as devices that measure the optical density or light scattering, can be placed in the path of the collected solution and used to detect the different fractions of the phase solution. Data gained from this sensing actuates the appropriate processor controlled to determine whether

the column should be collected for further processing or discarded to waste. The sensor may be positioned opposite the inlet collection conduit or waste collection conduit of the collection assembly (e.g., devices 12 in Fig. 1C). Alternatively, a sensor may be fixed and determine appropriate fluid fractions for collection and separation by analysis of scanned data.

On page 10 beginning at line 21 please replace the paragraph with the following amended paragraph:

In yet another embodiment, the flow centrifuge also acts as a mixer in which the bowl can be modified to have small mixer/agitator vanes 11 at the base of the bowl to provide for complete low speed alternate rotation for mixing of the introduced multiphase mixture, prior to centrifugal partition of the aqueous phases. For example, during automated, continuous operation of the centrifugal separator, the buffer solutions and buffers containing plant material disrupted to release the nuclei from cells, phase buffers or other appropriate solutions or additives may be added to the bowl and the phase buffer and other ingredients gently mixed together by the impeller action of the mixing vanes or agitator 11 at low speed. An increase in the speed of rotation in the bowl mode causes the solutions and materials to migrate along the walls of the bowl under the influence of the applied centrifugal field until the solutions accumulate at the radial extremity of the bowl.